



US009423108B2

(12) **United States Patent**
Spintge et al.

(10) **Patent No.:** **US 9,423,108 B2**
(45) **Date of Patent:** **Aug. 23, 2016**

(54) **SOCKET FOR A LAMP HAVING AN OLED ILLUMINANT**

(75) Inventors: **Ulrich Spintge**, Sprockhoevel (DE);
Karsten Diekmann, Rattenberg (DE);
Britta Goeoetz, Regensburg (DE);
Steven Rossbach, Adorf (DE); **Vincent Johannes Jacobus Van Montfort**,
Sittard (NL); **Tom Munters**, Alken
(BE)

(73) Assignees: **PANASONIC CORPORATION**,
Osaka-Fu (JP); **OSRAM OLED**
GMBH, Regensburg (DE);
OLEDWORKS GMBH, Aachen (DE)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 535 days.

(21) Appl. No.: **13/880,228**

(22) PCT Filed: **Oct. 18, 2011**

(86) PCT No.: **PCT/EP2011/068194**

§ 371 (c)(1),

(2), (4) Date: **Jan. 28, 2014**

(87) PCT Pub. No.: **WO2012/052441**

PCT Pub. Date: **Apr. 26, 2012**

(65) **Prior Publication Data**

US 2014/0140041 A1 May 22, 2014

(30) **Foreign Application Priority Data**

Oct. 18, 2010 (DE) 10 2010 038 352

(51) **Int. Cl.**

F21V 19/00 (2006.01)

F21K 99/00 (2016.01)

(Continued)

(52) **U.S. Cl.**

CPC **F21V 19/0025** (2013.01); **F21K 9/00**
(2013.01); **F21S 2/005** (2013.01); **F21V 21/02**
(2013.01);

(Continued)

(58) **Field of Classification Search**

CPC **F21V 19/0025**; **F21V 21/02**; **F21V 23/06**;
F21K 9/00; **F21S 2/05**; **F21Y 2101/02**;
F21Y 2105/008; **Y02B 20/36**; **H01R 13/14**
USPC **362/249.02**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,184,628 B1 2/2001 Ruthenberg
6,787,990 B2* 9/2004 Cok **F21K 9/13**
313/499

(Continued)

FOREIGN PATENT DOCUMENTS

DE 102006015437 A1 10/2007
JP 355140202 U 10/1980

(Continued)

OTHER PUBLICATIONS

International Search Report, International Application No. PCT/
EP2011/068194, Jan. 10, 2012, 12 pages.

(Continued)

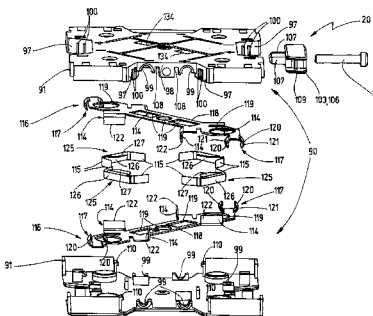
Primary Examiner — Laura Tso

(74) *Attorney, Agent, or Firm* — Fitch, Even, Tabin &
Flannery LLP

(57) **ABSTRACT**

The invention relates to an illuminant (23) and a socket (20) for a lamp (15). The features of the socket can be implemented also independently of the features of the illuminant (23). The socket has supply terminal areas on multiple sides of the socket housing such that the socket (20) can be selectively supplied with electricity and wired from different sides or also simultaneously from multiple sides. Independently of the number and the arrangement of the supply terminal areas (94), multiple electrical supply terminals (95) having the same polarity are provided on the socket (20). Said supply terminals (95) having the same polarity are electrically short-circuited by means of a shorting connector (116), in particular two identical shorting connectors (116) being arranged in the socket housing. Said socket (20) and illuminant (23) modularly achieve large total illumination surfaces in a lamp (15) and an appealing appearance in a very simple manner.

18 Claims, 11 Drawing Sheets



- | | | | | | | | | | |
|------|--------------------|--|--|----|------------|----|---------|--|--|
| (51) | Int. Cl. | | | | | | | | |
| | F21S 2/00 | (2016.01) | | JP | 2004127910 | A | 4/2004 | | |
| | F21V 21/02 | (2006.01) | | JP | 2007139016 | A | 6/2007 | | |
| | F21V 23/06 | (2006.01) | | JP | 2007250303 | A | 9/2007 | | |
| | H01R 13/14 | (2006.01) | | JP | 2007273205 | A | 10/2007 | | |
| | F21Y 101/02 | (2006.01) | | JP | 2009519577 | A | 5/2009 | | |
| | F21Y 105/00 | (2016.01) | | JP | 2009531569 | A | 9/2009 | | |
| | | | | JP | 2010514113 | A | 4/2010 | | |
| | | | | JP | 2010135250 | A | 6/2010 | | |
| (52) | U.S. Cl. | | | WO | 2009072386 | A1 | 6/2009 | | |
| | CPC | F21V 23/06 (2013.01); H01R 13/14 | | WO | 2010101405 | A2 | 9/2010 | | |
| | | (2013.01); F21Y 2101/02 (2013.01); F21Y | | WO | 2012052440 | A2 | 4/2012 | | |
| | | 2105/008 (2013.01); Y02B 20/36 (2013.01) | | | | | | | |

OTHER PUBLICATIONS

(56) **References Cited**

U.S. PATENT DOCUMENTS

- | | | | | | |
|--------------|------|---------|-----------------|-------------|--|
| 7,108,392 | B2 * | 9/2006 | Strip | G06F 1/1601 | |
| | | | | 362/145 | |
| 7,553,162 | B2 | 6/2009 | Isoda et al. | | |
| 2003/0031032 | A1 | 2/2003 | Wu et al. | | |
| 2003/0222558 | A1 | 12/2003 | Cok | | |
| 2005/0148241 | A1 | 7/2005 | Kohen | | |
| 2005/0239342 | A1 | 10/2005 | Moriyama et al. | | |
| 2006/0082315 | A1 | 4/2006 | Chan | | |
| 2008/0130275 | A1 | 6/2008 | Higley et al. | | |
| 2008/0297072 | A1 | 12/2008 | Snijder et al. | | |
| 2011/0013390 | A1 | 1/2011 | Biebel et al. | | |
| 2011/0318954 | A1 * | 12/2011 | Lin | H01R 4/2404 | |
| | | | | 439/366 | |
| 2012/0194970 | A1 | 8/2012 | Verjans et al. | | |

FOREIGN PATENT DOCUMENTS

- | | | | |
|----|------------|---|--------|
| JP | 2003059331 | A | 2/2003 |
| JP | 2003068129 | A | 3/2003 |

Office communication in corresponding European application No. 11773243.8, dated Jan. 30, 2015, 4 pages.

Notification of Reasons for Refusal in corresponding Japanese application No. 2013-534298, dated Jan. 6, 2015.

International Search Report in International Application No. PCT/EP2011/068193, dated Apr. 17, 2012, 5 pages.

Office communication in European application No. 11771136.6, dated Jan. 30, 2015, 6 pages.

Japanese Search Report in Japanese application No. 2013-534297, dated Dec. 24, 2014, 26 pages.

Notification of Reasons for Refusal in Japanese application No. 2013-534297, dated Jan. 23, 2015, 9 pages.

Notification of Reasons for Refusal in Japanese application No. 2013-534297, dated Oct. 25, 2015, 8 pages.

First Office Action in Chinese application No. 201180060760.6, dated Aug. 17, 2015, 22 pages.

Second Office Action in Chinese application No. 201180060760.6, dated Jan. 31, 2016, 8 pages.

Office Action in U.S. Appl. No. 13/880,156, dated Mar. 14, 2016, 21 pages.

* cited by examiner

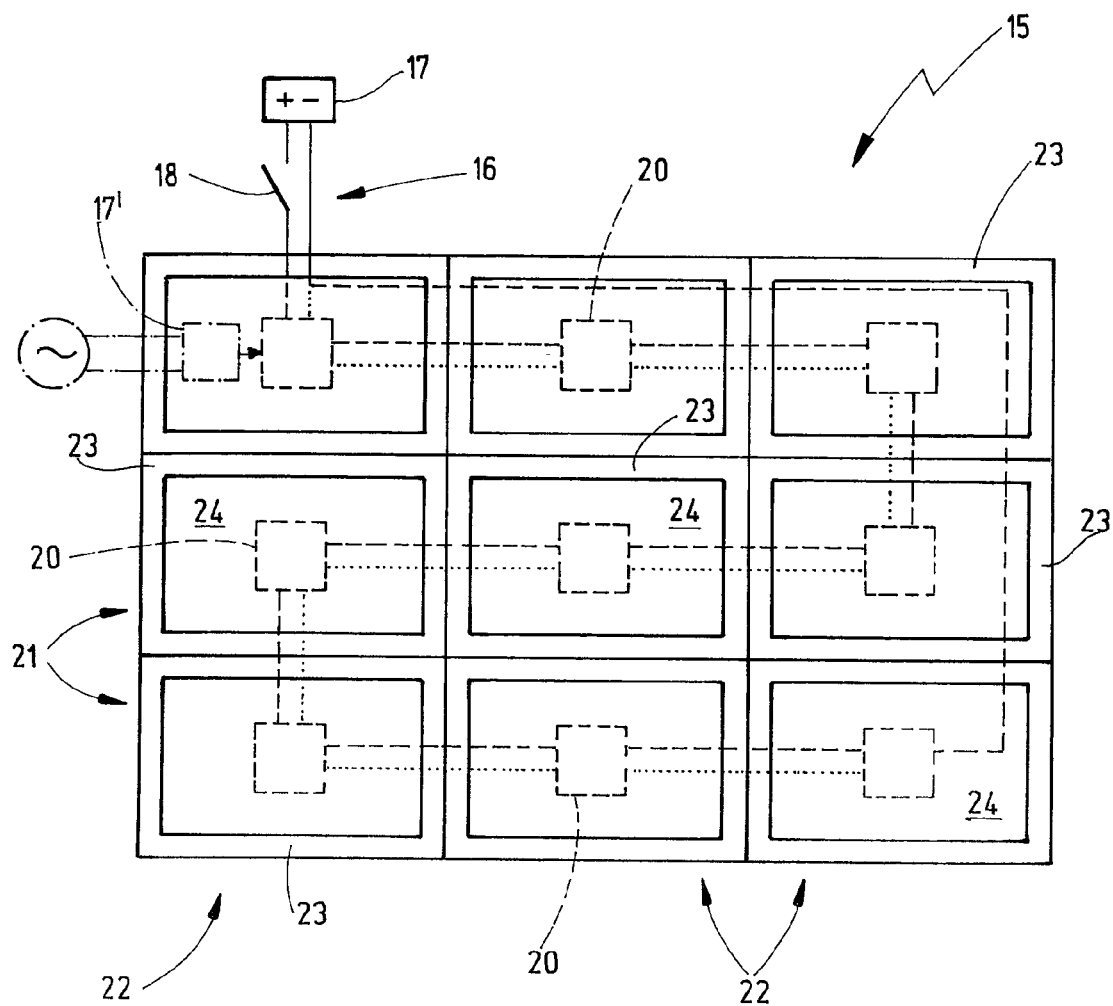


Fig.1

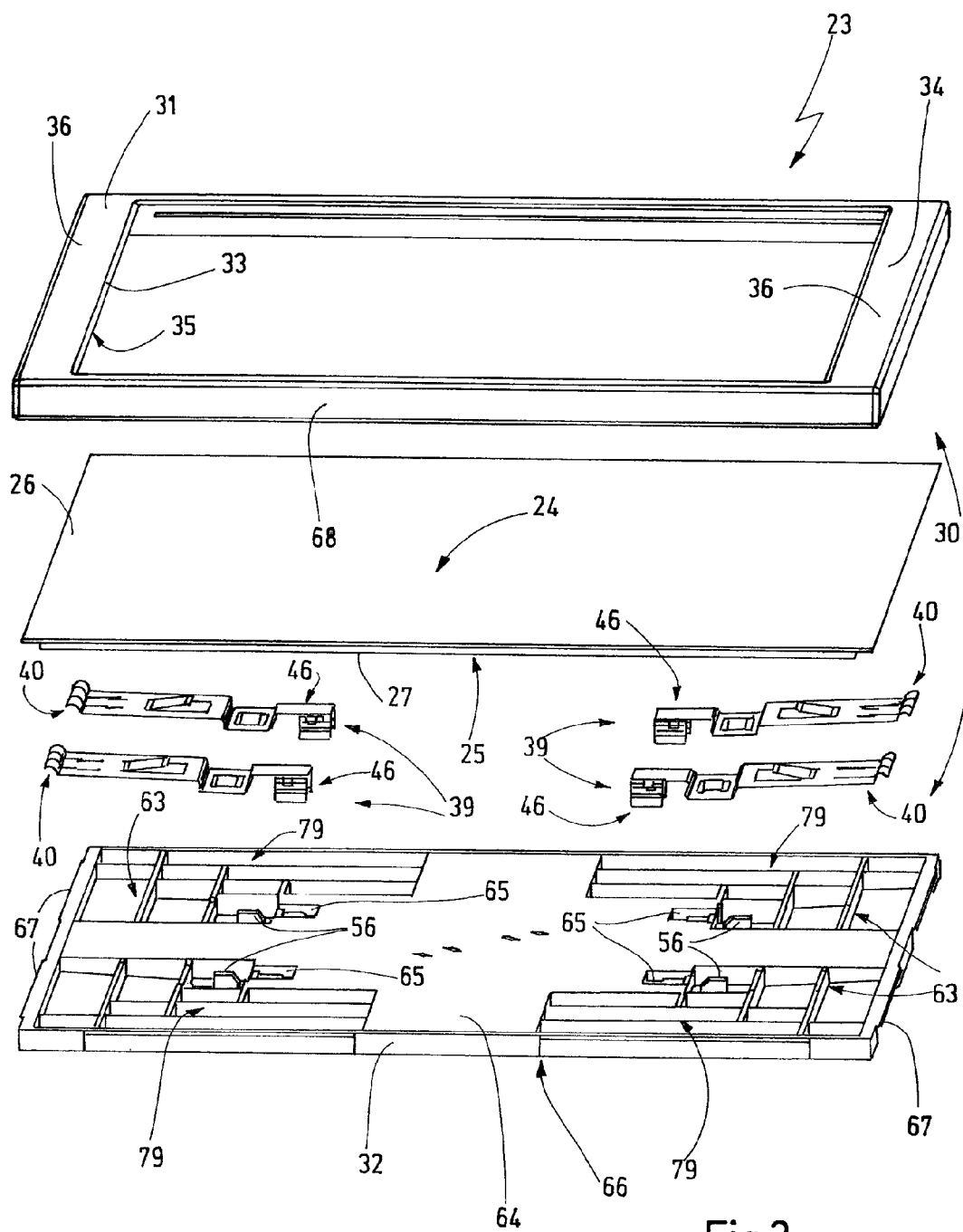


Fig.2

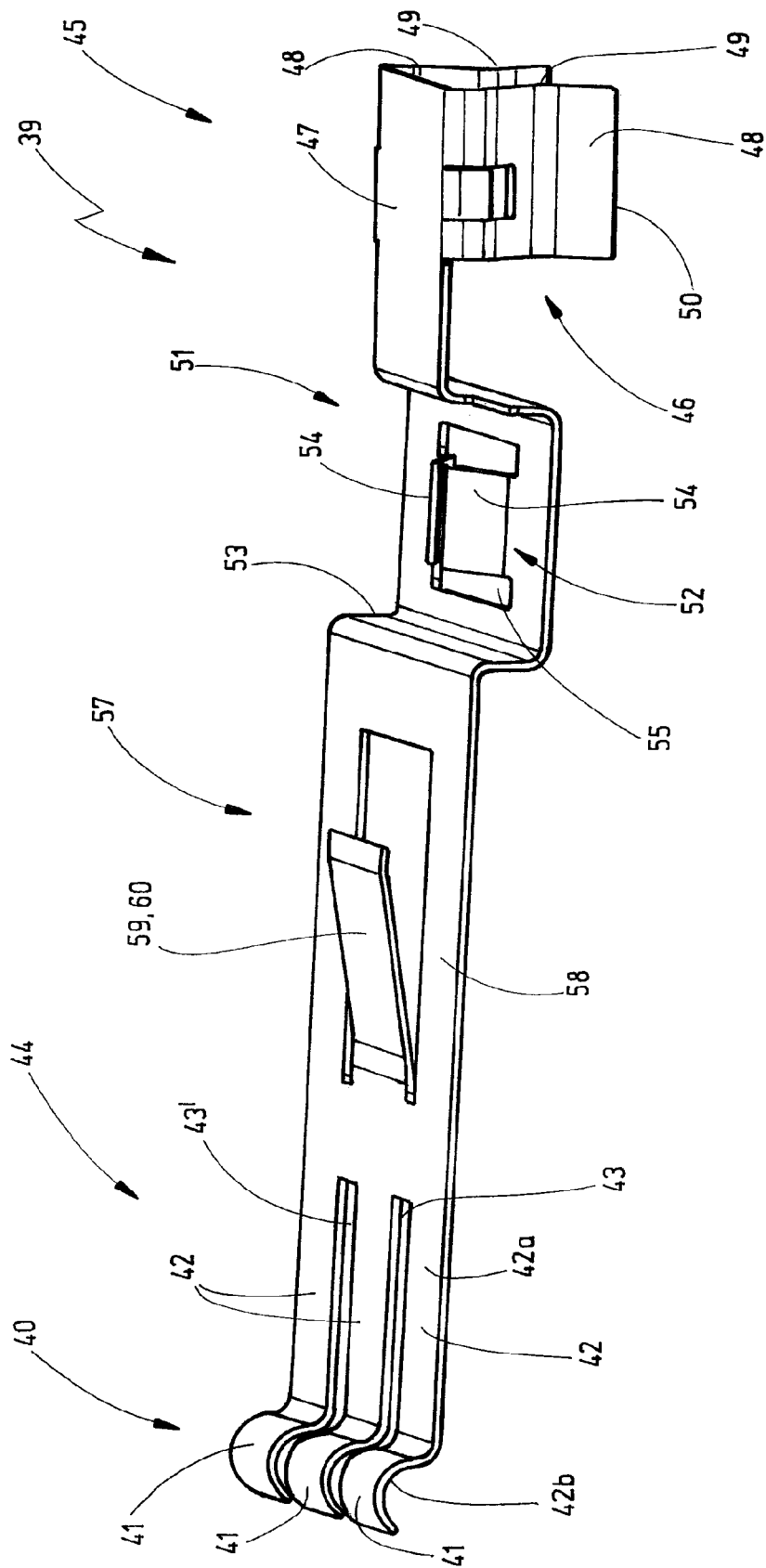


Fig.2a

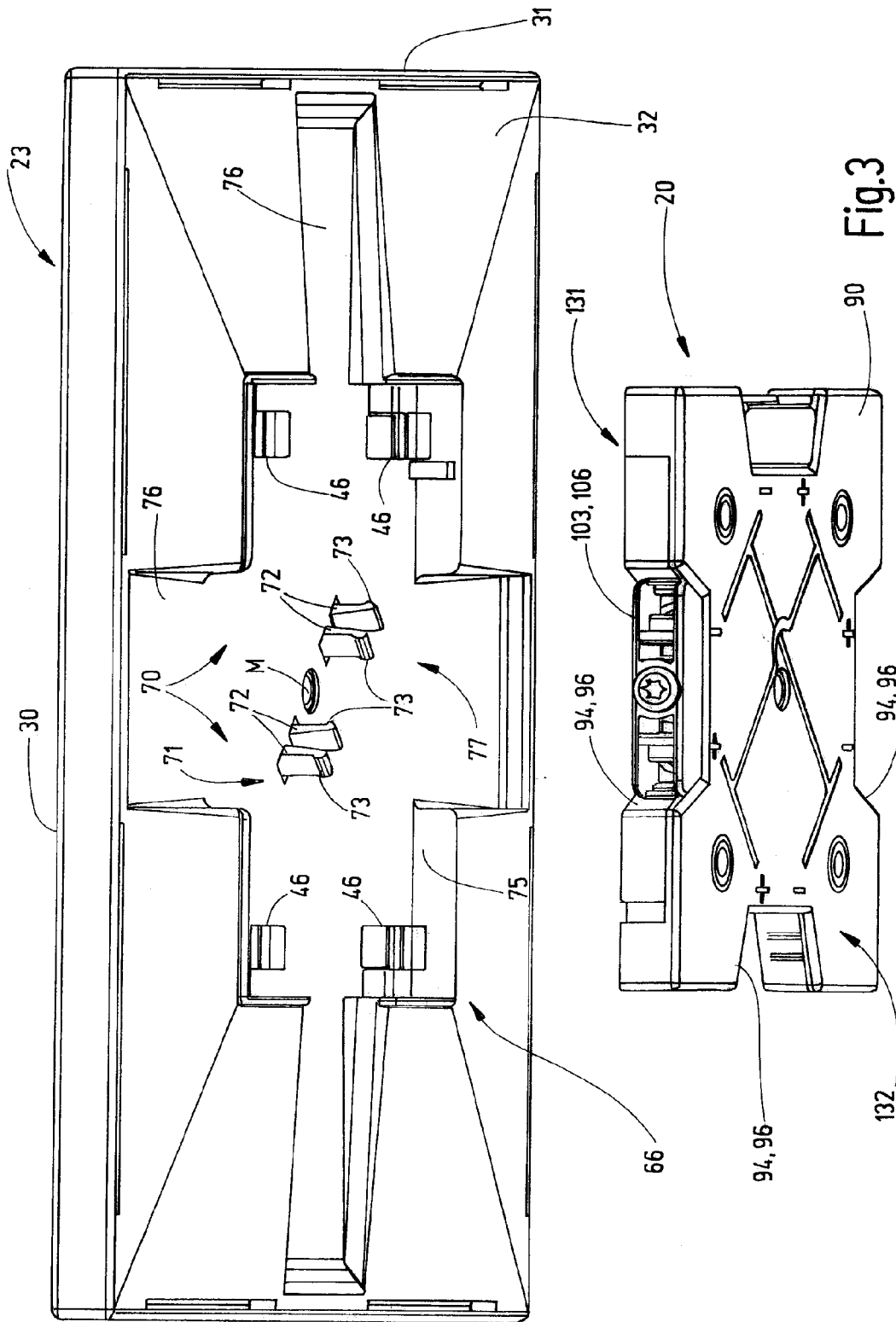


Fig.3

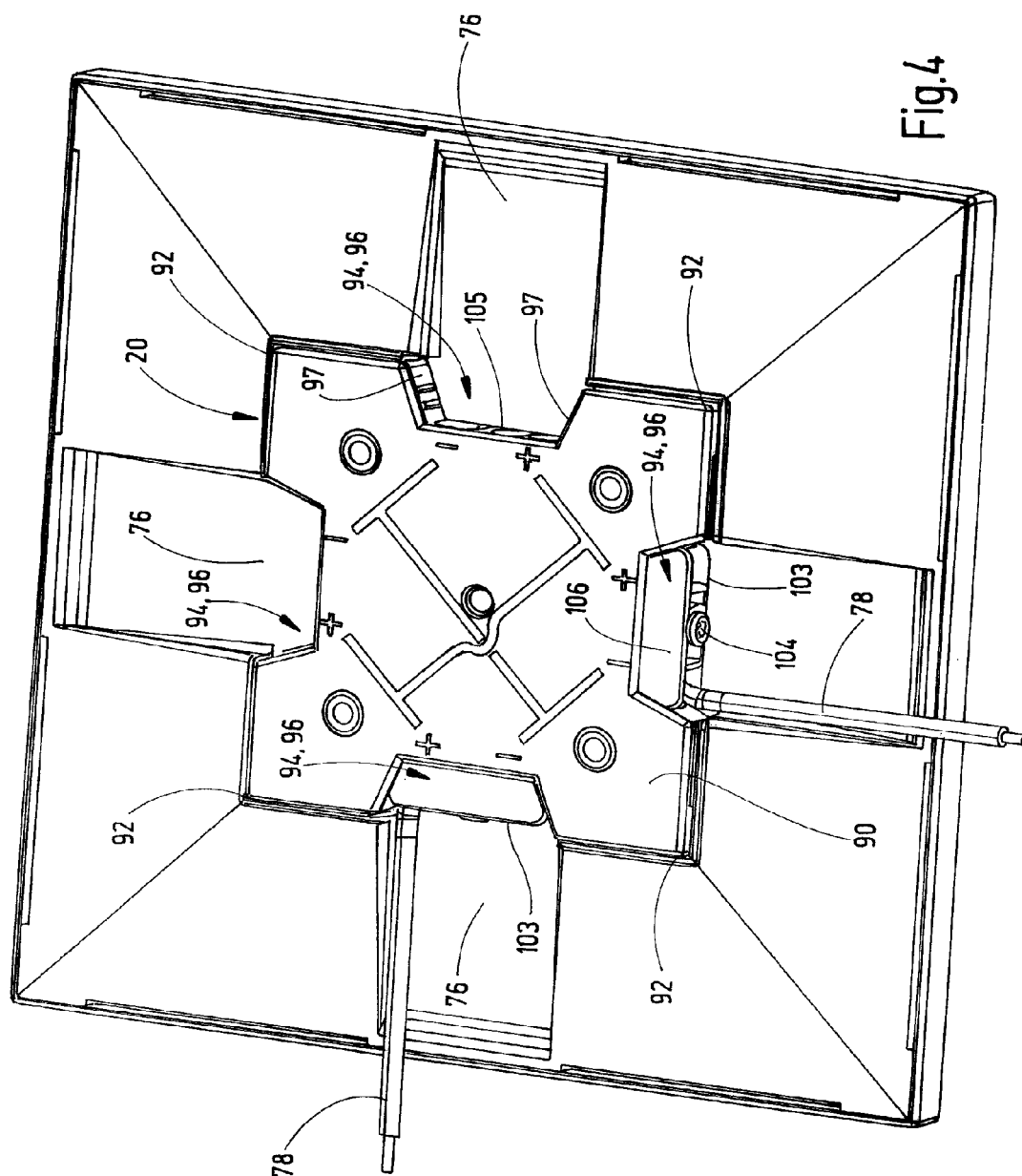


Fig. 4

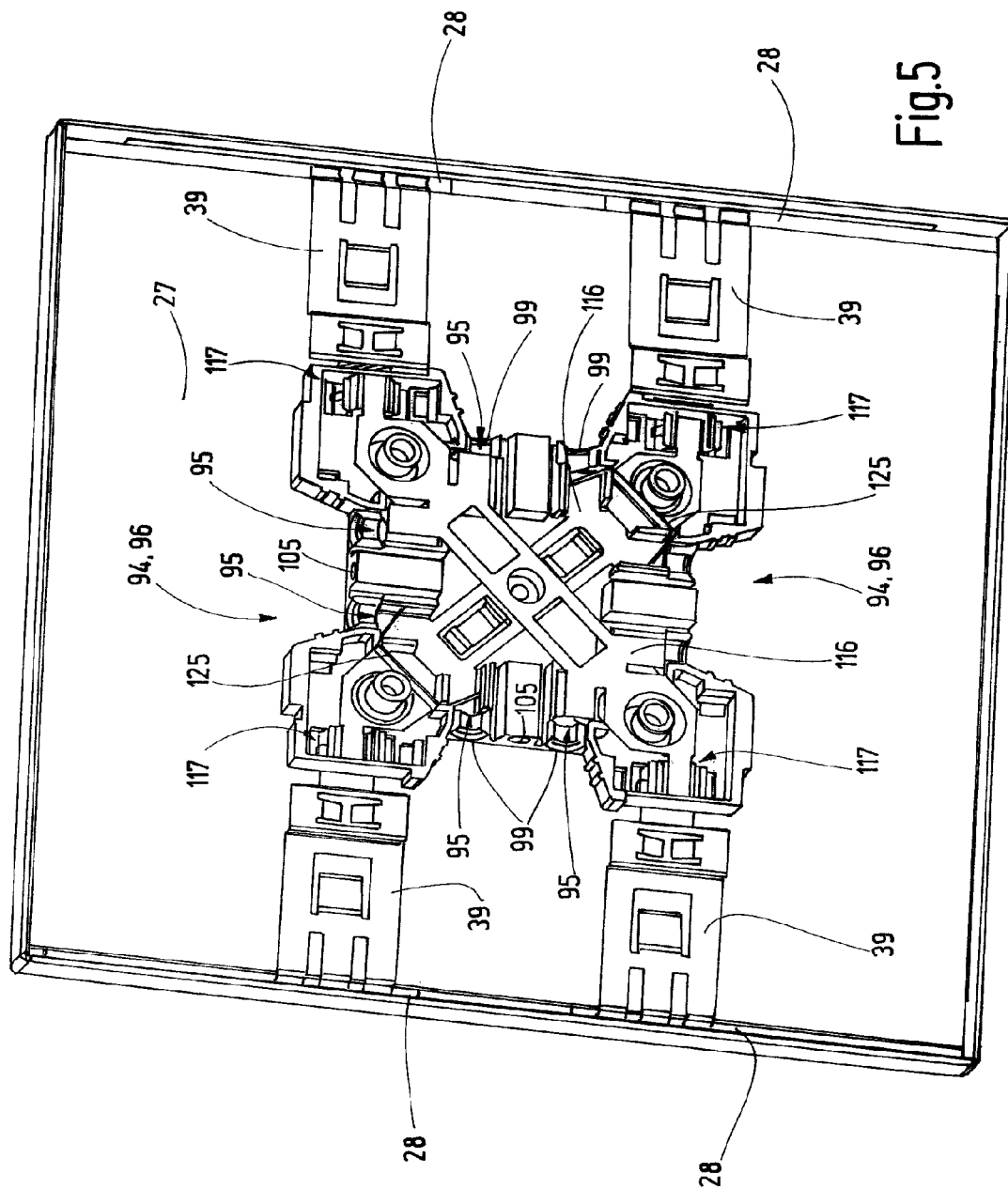


Fig. 5

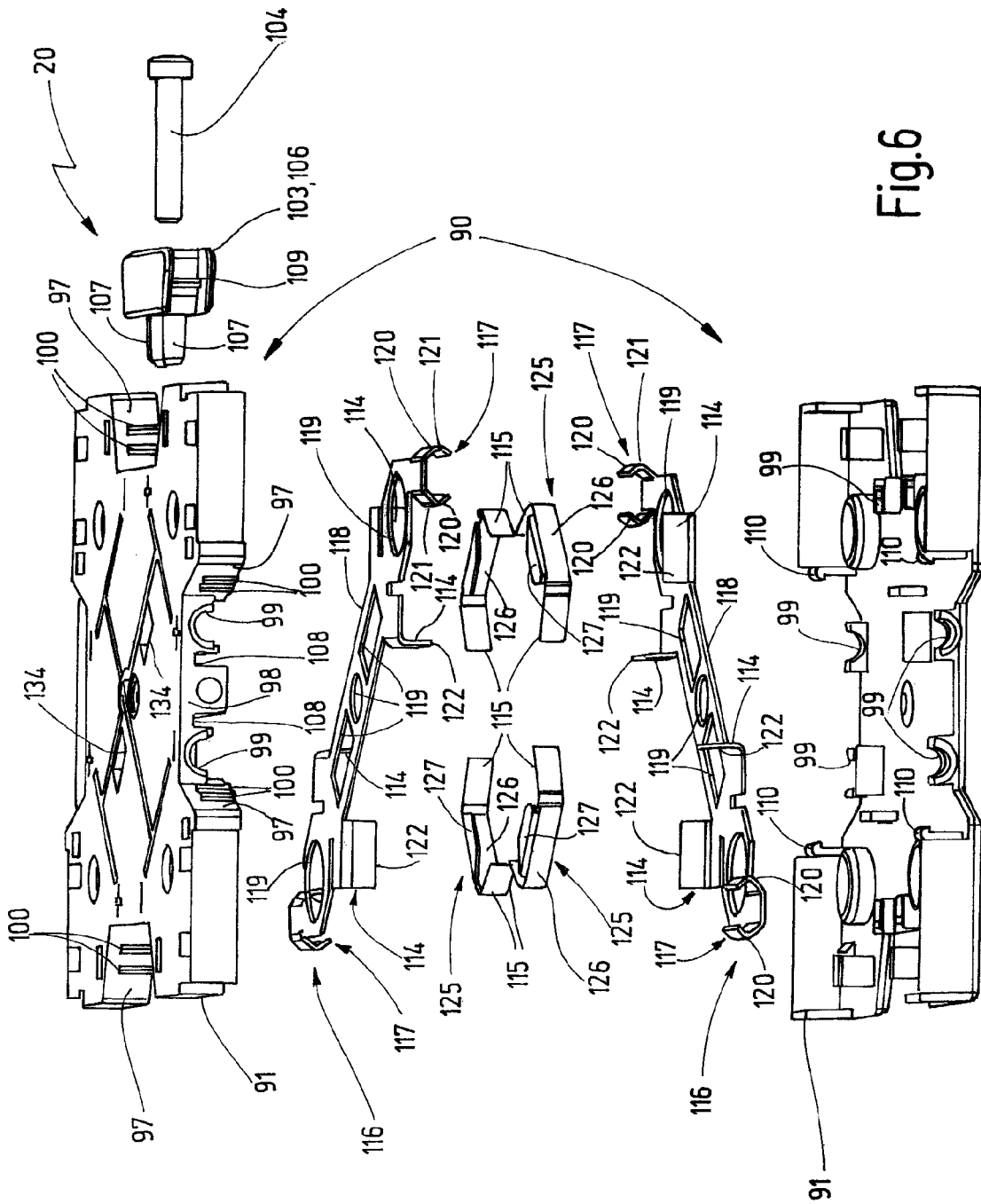


Fig.6

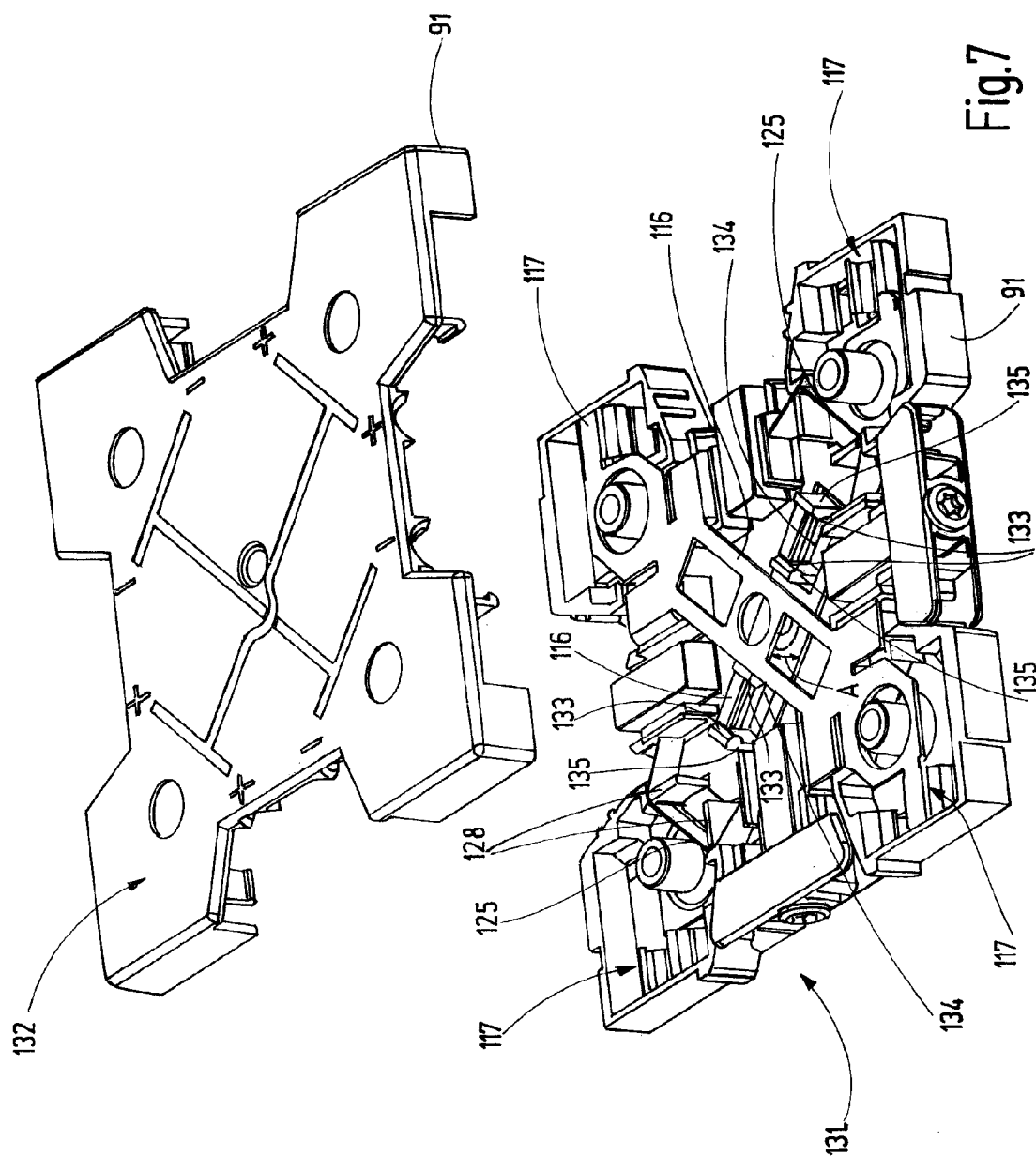


Fig. 7

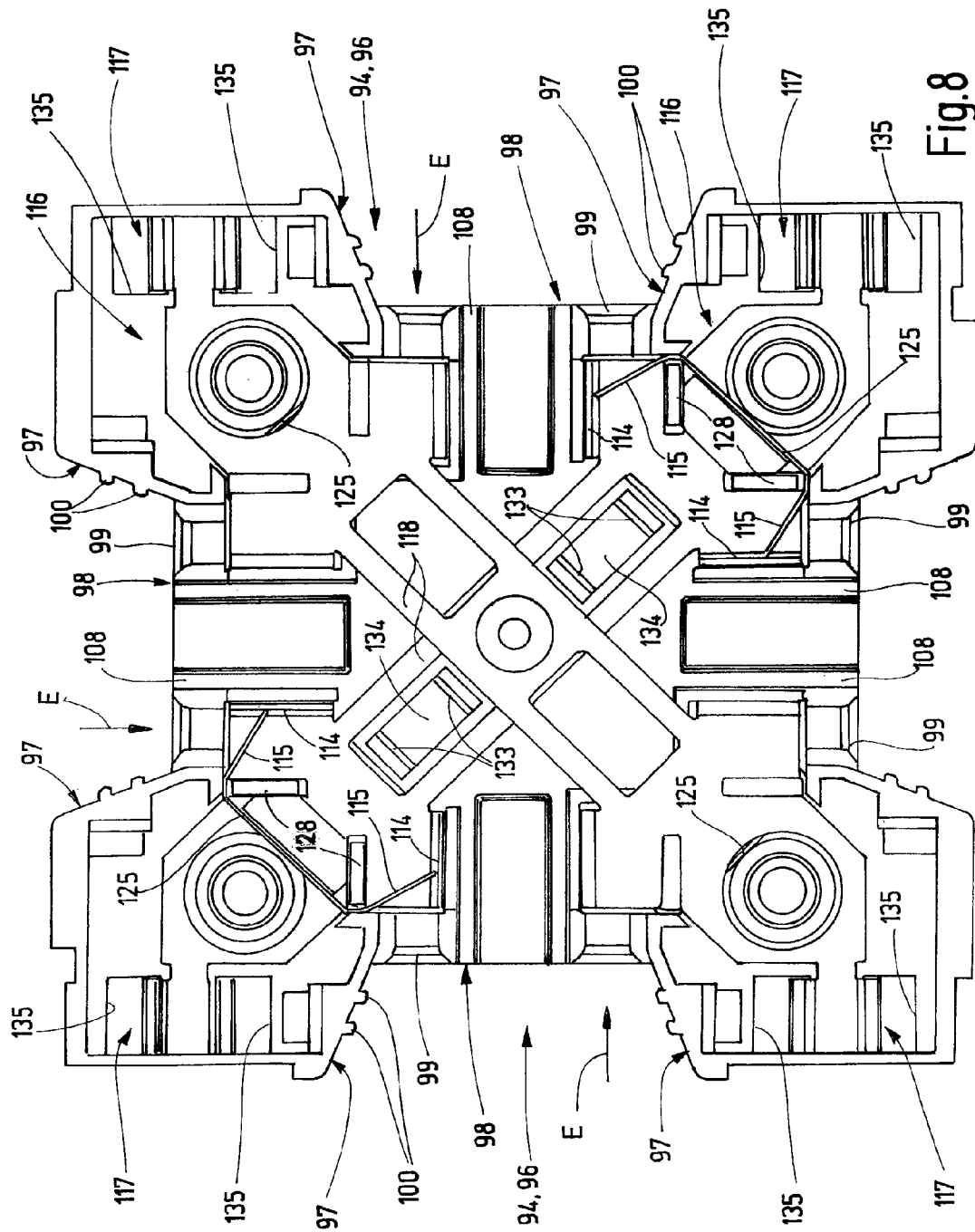
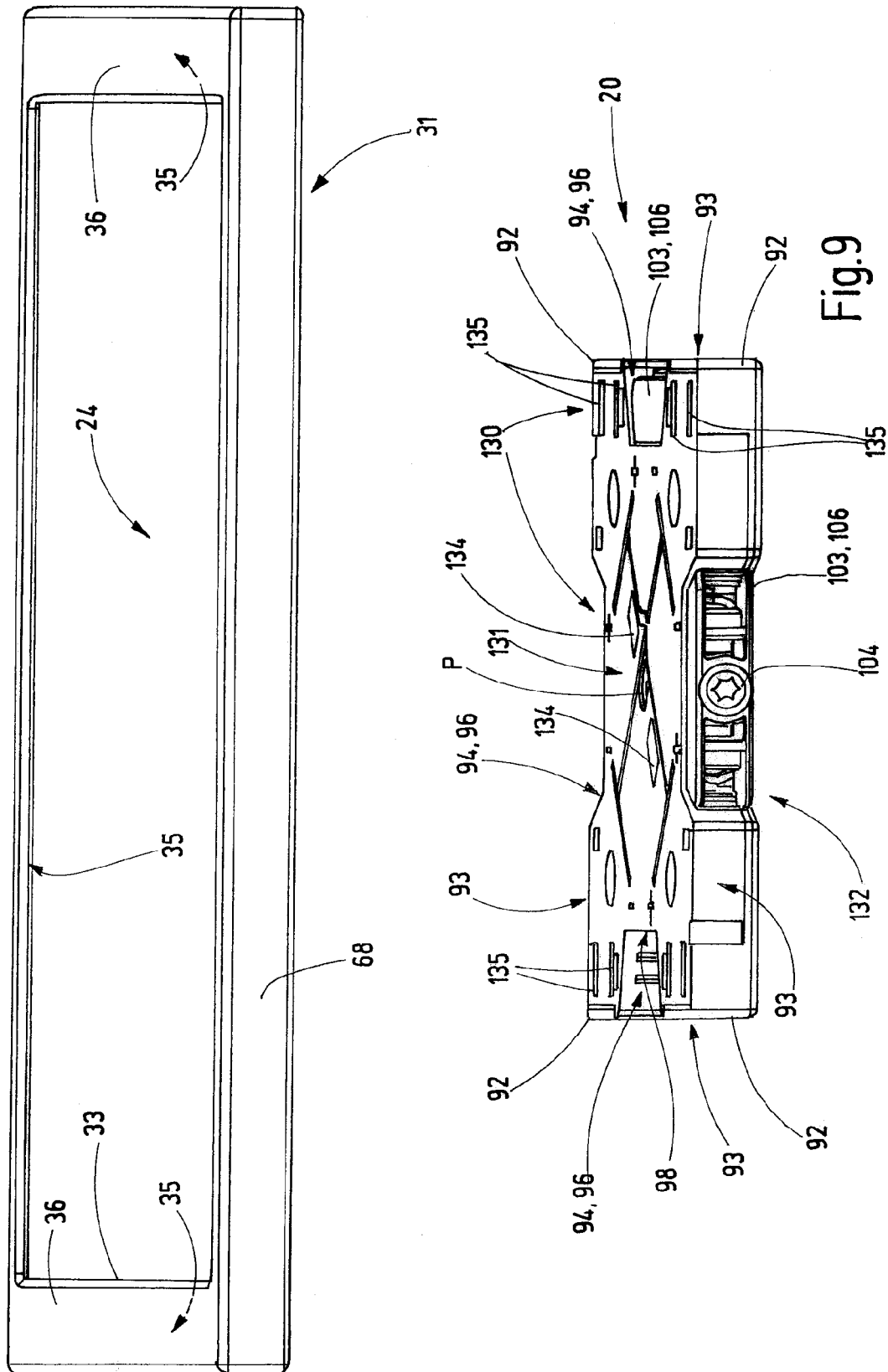


Fig.8



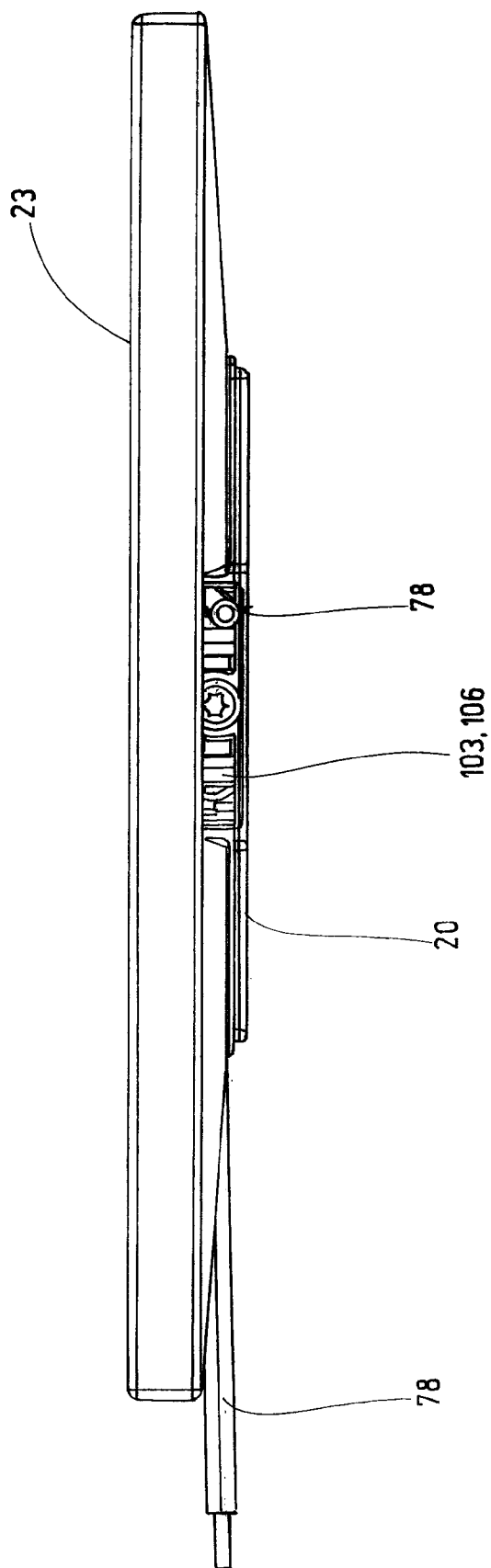


Fig.10

1

SOCKET FOR A LAMP HAVING AN OLED ILLUMINANT

CROSS REFERENCE TO RELATED APPLICATIONS

This patent application is the national phase of PCT/EP2011/068194 filed Oct. 18, 2011, which claims the benefit of German Patent Application No. DE 102010038252.3 filed Oct. 18, 2010, the contents of each which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

The invention relates to a lamp comprising a semiconductor lighting element, for example a light-emitting diode (LED) and, in particular, an organic light-emitting diode (OLED). The illuminant is designed as a planar illuminant. The demand for planar lamps is increasing. For example, such planar lamps are mounted to walls or ceilings for illumination and are of interest both because of their illuminating characteristics and their visually pleasing overall appearance and because of their low energy consumption.

BACKGROUND

Lamps comprising OLED illuminants and a socket have been known from prior art. For example, publication DE 603 06 720 T2 discloses an organic light-emitting diode layer located on a substrate. The substrate is designed as a plate and comprises a tab with electrical strip conductors on a narrow side. With the aid of this tab, the substrate can be inserted into a corresponding insertion opening of a socket and it is in contact with the strip conductors. Considering this, a planar installation on a wall or ceiling with adjacently arranged illumination surfaces is difficult. It has also been found that an exact alignment of the substrates on a common plane next to each other cannot be accomplished with the desired accuracy in such a connection between socket and illuminant.

Publication DE 603 06 721 T2 discloses additional connecting possibilities between illuminant and socket. For example, bracket-shaped sockets can be used, said sockets enclosing the substrate on two opposing sites. The electrical contact between the bracket-shaped socket and the illuminant is accomplished via conductors provided on one flat side of the substrate or via two substrate tabs provided on two opposing narrow sides, each substrate tab being provided with the respective electrical conductors. Such a lamp does not meet all of the requirements regarding their mountability or the desired visually appealing effect. The bracket-shaped socket has the disadvantage that the illuminant must be inserted into the socket from one side. Considering this arrangement of several illuminants in rows and/or columns, the replacement of at least the center illuminant is laborious and time-consuming.

Another LED lamp has been known from publication DE 10 2008 024 776 A1. A light-emitting diode is plugged into a housing and enclosed by a reflector that is also connected with the housing. For electrical contact, magnetic contacts that can be placed on magnetic contact surfaces are provided. The supply voltage is applied to the magnetic contact surfaces. In order to avoid a voltage reversal the magnetic polarity of the contact surfaces and the contact feet of the LED lamp are selected in such a manner that matching electrical contacts are magnetically attracted, whereas non-

2

matching electrical contacts are magnetically repelled. A protection against accidental contact is not provided for the electrically conductive parts.

Considering this prior art, the object of the present invention can viewed as being the provision of an improved socket for an illuminant, wherein a simple modular design of the lamp is to be made possible.

SUMMARY

This object is achieved by a socket in accordance with Patent claim 1. The socket comprises a socket housing, said socket housing comprising—on the connection side associated with an illuminant—a socket connection device. By means of the socket connection device, it is possible to establish the mechanical, as well as the electrical, connection, with the illuminant. In doing so, the socket connection device and an illuminant connection device of the illuminant preferably work together. The connection side opposite the mounting side of the socket housing is preferably disposed for mounting the socket housing to a mounting surface. The socket housing sides connect the connection side and the mounting side of the socket housing. On at least one socket housing side, there is a supply connection region comprising one or more supply connections for an electrical connection of the socket with a supply line. Preferably, such supply connection regions are provided on several socket housing sides so that the electrical wiring of a lamp with several sockets is simplified. Consequently, the result is a randomly expandable and simple modular design of a lamp comprising several sockets.

The supply connections of the socket are assigned either to the positive pole or to the negative pole. In an advantageous embodiment, all the supply connections displaying the same polarity are short-circuited with one another. This simplifies a series or parallel connection of several sockets of a lamp. In order to further simplify mounting the socket, each socket housing comprising supply connections may be provided with one supply connection displaying positive polarity and one supply connection displaying negative polarity. It is particularly preferred if all the socket housing sides have supply connections displaying positive and negative polarities. In particular, it is possible to provide supply connections displaying the same polarity in opposite corner regions of the socket housing.

Preferably, in particular two electrically conductive short-circuit connectors are present in the socket housing. Each short-circuit connector may be manufactured as a one-piece punched and/or bent part of a uniform material, without joint or connection points. Each short-circuit connector comprises several connection surfaces. Each supply connection that is to be short-circuited by the short-circuit connector is allocated one of the connection surfaces of a shared short-circuit connector. The electrical supply conductors of the supply lines abut against these connection surfaces when the socket is connected to the supply line.

In a preferred exemplary embodiment, the socket connection device comprises electrical socket connections that are disposed for the electrical connection of the illuminant. In so doing, in particular an additional mechanical connection may occur via detent means and/or plug means. For example, the socket connections interact with the illuminant connections of an associate illuminant.

Preferably, the socket connects displaying the same polarity are also electrically short-circuited with each other. In particular, this short-circuit connection is accomplished by a short-circuit connector. In this manner, it is possible to

provide several socket connections displaying the same polarity on the socket, all of said socket connections being on the same potential. The illuminant connections provided on the illuminant can thus be selectively connected to one or more socket connections displaying the same polarity. In doing so, there will also be the option of connecting the illuminant in various orientations or alignments with the socket.

Furthermore, it is of advantage if the short-circuit connector associated with the negative pole and the short-circuit connector connected with the positive pole have an identical form. In doing so, it is sufficient to only manufacture one form of short-circuit connector, thus reducing the costs of the socket. Each short-circuit connector may have a connecting section and contact surfaces at an angle relative to the connecting section. In the normal position of use, the short-circuit connectors may cross each other, thus being arranged separated from each other by an insulation distance. This isolation distance can be achieved if both short circuit members are preferably inserted in reverse position in the socket housing. Preferably, no insulation member is provided at the crossing point between the two connection sections. The air gap at this location is sufficient for electrical insulation. In order to achieve this insulation distance, the two short-circuit members are preferably installed in reverse position in the socket housing so that the sections having the contact surfaces act as spacing means that create the insulation distance at the crossing point.

The socket may comprise a strain relief means provided in the region of the supply connection. Preferably, this may be a separate strain relief member that can be detachably connected to the socket housing side. The strain relief is achieved by clamping the electrical cable plugged into the supply connections in place in a non-positive manner.

An illuminant suitable for the socket comprises a carrier element with a semiconductor lighting element. The carrier element may carry the semiconductor lighting element or, alternatively, may also be a component of the semiconductor element. Semiconductor lighting elements that can be considered are all planar semiconductor lighting elements. In particular, the semiconductor lighting element is an organic light-emitting diode (OLED) that is applied in multiple layers in a planar manner to a carrier surface of the carrier element. The carrier element has a plate-like or foil-like form. The carrier element may be composed of several layers and, for example, comprise two glass plates between which the semiconductor lighting element is arranged.

The plate-like or foil-like carrier element is arranged in an illuminant housing. The illuminant housing has a light exit opening through which the semiconductor lighting element can emit light. Preferably, the illuminant housing completely encloses the carrier element—apart from the light exit opening. The illuminant housing is electrically insulating. In this manner, protection against accidental contact is provided, so that the illuminant can be used for low-voltage lamps as well as for high-voltage lamps. In particular, the illuminant housing comprises a frame, said frame delimiting the light exit opening all the way around, and a housing rear wall.

An illuminant connection device is provided on the rear face of the illuminant housing on the housing rear wall. This illuminant connection device is disposed to establish a mechanical, as well as an electrical, connection with the socket. By arranging the connection device on the rear side of the illuminant opposite the front side, it can completely cover the socket once the connection has been established. Due to this, a particularly visually pleasing overall appear-

ance of the lamp can be achieved. A simple option for the connection between the illuminant and the socket can be achieved, for example, in that the illuminant connection device comprises a detent means and/or a plug means. In so doing, the illuminant can preferably be snapped on or slipped on at a right angle with respect to the plane of its preferably planar illumination surface. Therefore, mounting and replacing the illuminant are particularly easy and can be accomplished, in particular, without tools.

Preferably, the rear face of the illuminant housing has a recess that is disposed for the at least partial accommodation of the socket. Consequently, once the connection is established, the socket extends into the recess of the illuminant housing. In particular, the illuminant connection device is arranged in the recess. In this manner, it is possible to improve the protection against accidental contact on the connection site between the illuminant and the socket and, additionally, achieve a flat design for a planar illuminant.

In a preferred exemplary embodiment, the frame of the illuminant housing has an abutment surface against which abuts a light-emitting side of the carrier element, in particular in a planar manner. Both the abutment surface and the light-emitting side are configured, in particular, as planar surfaces.

In order to achieve a particularly good alignment between the illuminant and the socket several spaced apart connection sites are provided, said connection sites allowing a more accurate positional fixation of the illuminant on the socket. Preferably, the rear face of the illuminant housing may also have a surface that abuts against a counter-face of the socket once the connection is established.

Elastic bearing elements may be arranged in the illuminant housing between the carrier element and the cover, said elements pressing the light-emitting side of the carrier element against the abutment surface on the frame.

For providing the electrical connection with the socket, the illuminant connection device is preferably accessible via the electrical illuminant connections that are provided on the rear face of the illuminant housing and may be provided in addition to the detent means and/or plug means.

Semiconductor contact surfaces may be provided on the carrier element, said surfaces being electrically connected either to the anode or to the cathode of the semiconductor illuminant element. If more than one semiconductor illuminant element is provided on the carrier element, it is possible to provide correspondingly more than two semiconductor contact surfaces. Preferably, the semiconductor contact surfaces are located on the contact side of the carrier element opposite the light-emitting side. The semiconductor contact surfaces are arranged within the electrically insulating illuminant housing and are thus protected against accidental contact.

Each illuminant connection of the illuminant connection device is electrically connected to an illuminant contact. This electrical connection is provided within the illuminant housing. Each illuminant contact abuts against one of the semiconductor contact surfaces. To accomplish this, an electrically conductive illuminant contact part is preferably arranged in the illuminant housing, said illuminant contact part comprising the illuminant contact as well as the illuminant connection. The illuminant contact part can be made of a uniform material as a one-piece punched and/or bent part without joints or connecting points. Such an illuminant contact part can be manufactured in a simple and economical manner. Referring to a preferred exemplary embodiment, the illuminant contact part has a spring-elastic zone. Via this

5

spring-elastic zone, the carrier element is elastically biased against the abutment surface of the frame.

A lamp in accordance with the invention comprises an illuminant as well as a socket. Preferably, several sockets are arranged next to each other on a mounting surface, for example, in rows and/or columns. In doing so, the illuminants mounted to the sockets have a common total illumination surface. Preferably, the illuminant housing may have a rectangular contour so that several illuminants forming a common total illumination surface abut against each other along a longitudinal side or a transverse side of the illuminant housing.

BRIEF DESCRIPTION OF THE DRAWINGS

Advantageous embodiments can be inferred from the dependent patent claims, as well as from the description. The description is restricted to essential features of the invention as well as to miscellaneous situations. The drawings are intended as a supplementary reference. They show in

FIG. 1 a schematic representation, similar to a block circuit diagram, of a lamp comprising several illuminants and several sockets;

FIG. 2 a perspective, exploded, representation of an exemplary embodiment of an illuminant;

FIG. 2a a perspective representation of an illuminant contact part of the illuminant as in FIG. 2;

FIG. 3 a perspective representation of the illuminant as in FIG. 2, with a view of the rear side, as well as a perspective representation of an exemplary embodiment of a socket;

FIG. 4 the illuminant and the socket as in FIG. 3, with the connection established;

FIG. 5 a perspective representation of the illuminant and the socket as in FIG. 4, wherein the housing rear wall of the illuminant, as well as the mounting surface of the socket, have been removed in order to illustrate the electrical connection;

FIG. 6 a perspective, exploded, representation of the socket as in FIGS. 3 through 5;

FIG. 7 the socket as in FIG. 6, in partially mounted state;

FIG. 8 a plan view of the opened socket housing, viewed from the mounting side;

FIG. 9 a perspective view of the illuminant and the socket as in FIG. 3, looking obliquely at the front side of the illuminant and the connection side of the socket; and

FIG. 10 a side view of the illuminant and the socket, with the connection established.

DETAILED DESCRIPTION

FIG. 1 shows a schematic diagram resembling a block circuit diagram of a lamp 15 that is connected to a voltage source 17 via a supply line 16. The voltage source 17 provides a DC voltage for supplying the lamp 15. The voltage source 17 may be a ballast device, for example. Only for symbolic purposes, a switch 18 exists in the supply line 16, said switch being disposed for switching the lamp 15 on and off. Instead of a voltage source 17, it is also conceivable to use a power source 17' as has been schematically indicated in chain lines. The power source 17' may be a component of a ballast device. The power source 17' may also be arranged as a power driver within the socket 20 and can be connected to the conventional voltage network. The sockets 20 are preferably connected in series to the power source 17'.

The lamp 15 comprises at least one socket 20. In the exemplary embodiment of FIG. 1, several sockets 20 are

6

provided, said sockets being arranged in a matrix-like manner at regular distances from each other in several rows 21 or in several columns 22. Each socket 20 is mechanically, as well as electrically, connected to an illuminant 23. In the exemplary embodiment, the illuminants 23 have a rectangular design. The illumination surfaces 24 of the illuminants 23 form a common total illumination surface of the lamp 15. In doing so, they are preferably in abutment with each other along the longitudinal edges or the transverse edges. The distance of the sockets 20 from each other is fixed accordingly. For connecting an illuminant 23 with a socket 20, said illuminant is slipped or snapped—in slip-on direction at a right angle to its illumination surface 24—onto the associate socket 20, without the use of tools. In the opposite, slip-off, direction the illuminant 23 may also be pulled from the socket 20, preferably without the use of tools.

On the one hand, the invention relates to the design of the illuminant 23 and, independently thereof, to the design of the socket 20. In addition, the socket 20 and the illuminant 23 can be combined to form a lamp 15.

FIG. 2 is a perspective, exploded, representation of an exemplary embodiment of the illuminant 23. The illuminant 23 comprises a carrier element 25 that has the form of a plate or foil. The carrier element 25 comprises the semiconductor lighting element or is a component of the semiconductor lighting element. In the exemplary embodiment, the carrier element 25 is composed of several layers in a sandwich-like manner. In doing so, the semiconductor lighting element is arranged between a transparent front plate or foil 26 and a rear plate or foil 27. In the exemplary embodiment, the plates 26, 27 are glass plates. The front plate or foil 26 is larger than the rear plate or foil 27 and, in the exemplary embodiment, extends over the rear plate or foil 27 on two opposing sides. The front surface of the front plate or foil 26 facing away from the semiconductor lighting element is the illumination surface 24 of the illuminant 23. Electrical contact surfaces 28 are provided on the contact side of the front plate 26, said contact side facing away from the illumination surface 24. It is possible to provide one or more pairs of contact surfaces 28. In the exemplary embodiment, two pairs of contact surfaces 28 are provided on the two projections of the front plate 26. Therefore, the semiconductor lighting element can be contacted at various points in order to achieve a more uniform illumination appearance, even when large illumination surfaces 24 are intended. One contact surface 28 of a pair is connected to the anode and the other contact surface 28 of the same pair is connected to the cathode of the semiconductor lighting element. FIG. 5 shows the contact surfaces 28. In the exemplary embodiment, the contact surfaces 28 are arranged on two opposite sides of the semiconductor lighting element.

In a preferred exemplary embodiment, the illumination surface 24 is designed so as to be a planar surface. In the lamp 15 shown by FIG. 1, the planar illumination surfaces 24 of the illuminant elements 23 are located on a common plane. In this manner, it is possible to modularly assemble large total illumination surfaces of individual illumination surfaces 24 of the illuminants 23 on ceilings or walls.

Furthermore, the illuminant 23 comprises an illuminant housing 30 that consists of an electrically insulating material. In doing so, the term electrically insulating is to be understood here to mean that the DC voltages of up to 200 V and direct currents of up to 2 to 3 A usually applied to the lamps 15 are insulated from each other. The illuminant housing 30 consists of a frame 31 and a housing rear wall 32 between which the carrier element 25 is supported. The frame 31 has a light exit opening 33 that has a rectangular

contour in the exemplary embodiment. The light of the illumination surface 24 is emitted through the light exit opening 33. Consequently, the illumination surface 24 represents the light-emitting side of the carrier element 25. The illuminant housing 30 preferably consists of a plastic material, for example, polycarbonate. This housing can be manufactured in an extremely simple and cost-effective manner by injection molding. Polycarbonate is amorphous and has minimal distortion.

Preferably, the illuminant housing 30 has a square or rectangular contour. In the preferred exemplary embodiment, it has a size of 150 by 150 millimeters. Side lengths corresponding to an integer divisor of 600 millimeters are preferred because ceilings in office or factory buildings frequently are divided into a grid of 600 by 600 millimeters. This results, for example, in building dimensions (length by width, or width by length) of 300 by 300 millimeters, 150 by 300 millimeters, 200 by 150 millimeters, 100 by 100 millimeters, 100 by 200 millimeters, etc.

The thickness or depth of the illuminant housing 30 between the illumination surface 24 and a rear face 66 of the housing wall 32 decreases from a center region toward all the sides in outward direction. As a result of this tapering housing shape a particularly advantageous visually pleasing appearance is achieved. The flatness of the illuminant housing 30 is emphasized. At the same time, there is sufficient space for the accommodation of the socket 20 in the center region.

A circumscribing strip 34 encloses the light exit opening 33. On the side facing the illumination surface 24, the strip 34 has an abutment surface 35 against which abuts the outer edge of the light-emitting side of the carrier element 25. The abutment surface 35 is configured as a planar surface. In modification of the exemplary embodiment, the abutment surface 35 could also be only provided on the two strip sections 36 that are provided on opposite sides of the light exit opening 33. In particular, the strip sections 36 are provided at the location, where the contact surfaces 28 are arranged on the carrier element 25 or on the front plate 26 in order to ensure, at the same time, sufficient protection against accidental contact. Considering each and every embodiment of the abutment surface 35, said surface has to be configured in such a manner that a desired orientation of the illumination surface 24 relative to the illuminant housing 30 is established. Basically, this can already be accomplished with three spaced apart abutment points.

Illuminant contact parts 39 for electrically contacting the semiconductor lighting elements are provided between the housing rear wall 32 and the carrier element 25. FIG. 2a shows an enlarged representation of the illuminant contact part 39. The illuminant contact part 39 is made of a one-piece member and does not possess any joints or seams, and consists of a uniform material. Preferably, it is configured as a punched or bent part and is manufactured by being punched out of sheet metal and by being subsequently bent into the desired form.

The illuminant contact part 39 comprises an illuminant contact 40 with which the illuminant contact part 39 abuts against the associate contact surface 28 on the carrier element 25. The illuminant contact 40 may have several contact points 41 that abut against the illuminant contact 40 on the associate contact surface 28. Referring to the exemplary embodiment, several, and preferably three, contact tabs 42 are provided, each of said tabs having the same shape. Each contact tab 42 has a planar section 42a where the free end section 42b having the contact point 41 adjoins. The end section 42b is at an angle relative to the plane

section 42a and has a curved profile. The contact tabs 42 can be moved toward each other and are separated from each other by slits 43 and 43'. Consequently, in the normal position of use, a spring action of the contact tabs 42 is created so that the contact points 41 abut against the contact surface 28 with a specific spring bias.

In the preferred exemplary embodiment as in FIG. 2, the illuminant 23 has two contact surfaces 28 each for the anode and for the cathode. Accordingly, the illuminant 23 has four illuminant contact parts 39.

The illuminant contact 40 forms the first end 44 of the illuminant contact part 39. On the opposite, second, end 45, the illuminant contact part 39 has an illuminant connection 46 that is disposed for the electrical connection with the socket 20. The illuminant connection 46 is configured as a detent-plug connection. It comprises two contact wings 48 that are connected with each other via a crosspiece 47, said contact wings being identical in form. The contact wings 48 extend transversely from the crosspiece 47, in which case they first approach each other up to a bending point 49 and then, beginning at the bending point 49, extend away from each other toward their respectively free end 50. The two contact wings 48 are at the smallest distance from each other at the opposing bending points 49. The contact wings 48 extend away from the crosspiece in a direction opposite the bent ends 42b of the contact part 40. The crosspiece 47 is located on approximately the same plane as the planar section 42a of the contact tabs 42.

The first end 45 of the illuminant contact part 39 terminates in a holding section 51 where a holding clamp 52 is provided. In accordance with the example, the holding section 51 has an offset 53 within which the holding clamp 52 is located. The holding clamp is formed by two opposing clamping tabs 54 that are resiliently supported on opposite sides of a holding recess 25 on the holding section 51. The two reeds 54 extend obliquely toward each other above the retention opening 55 in the offset 53 so that their free ends are arranged next to each other in the offset 43. In the normal position of use, the illuminant contact part 39 is slipped onto a retention projection 56 on the housing rear wall 32, said projection extending through the retention opening 55 and, in so doing, being affected in a clamping manner on both sides by the clamping tabs 54.

The illuminant contact part 39 has a spring-elastic zone 57 between the retention section 51 and the first end 44. The spring-elastic zone 57 has an elastically resilient spring tab 59 that is arranged on the tab holding part 58 of the spring-elastic zone 57. In particular, said spring tab is punched out of the tab holding part 58 and is angled at the edge of the punched out opening. The spring tab 59 extends obliquely away from the tab holding part 58. In the exemplary embodiment, the tab holding part 58 is in planar extension of the planar section 42a of the contact tabs 42. In the normal position of use, the spring tab 59 of the spring-elastic zone 57 acts as an elastic bearing element 60. One or more elastic bearing elements 60 are provided between the housing rear wall 32 and the carrier element 25 in order to press the carrier element 25 against the abutment surface 35 of the frame 31, so that said carrier element adopts the desired position. As is shown by FIG. 2, in this case there are four bearing elements 60. In the preferred exemplary embodiment, they are represented by the spring-elastic zone 57 and, in particular, by the spring tab 59. In the normal position of use, the spring tab 59 abuts against the carrier element 25 in a spring-biased manner.

In mounted condition, the illuminant contact parts 39 are respectively seated in a receiving region 63 on the side 64 of

the housing rear wall 32 associated with the carrier element. Each receiving region 63 has an illuminant connection opening 65 for the illuminant connection 46, said opening completely extending through the housing rear wall 32. As a result of this, the illuminant connection 46 and the contact wings 48, respectively, are accessible from the rear face 66 of the housing rear wall 32.

In the established normal position of use of the illuminant 23, the frame 31 completely encloses the outside circumference of the housing rear wall 32. In doing so, preferably a detent connection is created between the frame 31 and the housing rear wall 32. To accomplish this, the exemplary embodiment has locking catches 67 on at least two opposing side edges, said locking catches coming into engagement with the indentations on the inside of the circumscribing frame side 68.

On the rear face 66 of the illuminant 23 or the illuminant housing 30, an illuminant connection device 70 is provided, said device being disposed for establishing the electrical, as well as the mechanical, connection with the socket 20. The illuminant connection device 70 comprises at least two and, in accordance with the example, four illuminant connections 46. Each of these illuminant connections 46 is connected in an electrically conductive manner with an illuminant contact 40 via the illuminant contact part 39 and thus provides the electrical connection to the respective anode or cathode of the semiconductor lighting element.

The illuminant connection device 70 further comprises detent means 71 that are exclusively disposed for establishing or aiding the mechanical connection between the illuminant 23 and the socket 20. In the described exemplary embodiment, the detent means 71 are represented by several detent projections 72. The detent projections 72 extend away from the rear face 66 of the illuminant housing 30. On their free ends, there is a lateral detent bulge 73. In snapped-on position, the detent projections 72 extend through a detent recess 74 on the socket, and the detent bulges 73 extend behind a respectively associated detent edge on the socket 20. In the exemplary embodiment, the detent projections 72 are arranged next to each other in pairs at a distance from each other. The detent bulges 73 extend in opposite direction away from the respectively adjacent detent projection 72.

The form and/or the size of the detent projections 72 and, in particular, of the detent bulges 73 may be selected in such a manner that sufficient retention of the detent connection is ensured and also the forces for establishing and/or separating the detent connection do not become too great. For example, the inclination and/or the size of an oblique surface 74a of the detent bulge 73 adjoining the free end of the detent projection 72 can be prespecified for adjusting the desired slip-on force when the detent connection is made. Analogously, the inclination and/or the size of a detent abutment surface 74b with which the detent bulge 73 abuts against the associate detent edge of the socket 20 with the detent connection established can be prespecified for adjusting the desired pull-off force when separating the detent connection. The size and inclination of the surfaces 74a, 74b relates to the extension direction of the detent bulge 73 transverse to the slip-on and/or pull-off forces of the illuminant 23. The slip-on and/or pull-off forces are adapted to the stability of the illuminant 23 in order to not damage it when it is being slipped on and pulled off.

The illuminant connection device 70 is arranged in a recess 75 of the housing rear wall 32. The illuminant connections 46 and the detent projections 72 are arranged so as to be point-symmetrical with respect to a center M of the recess 75 or the rear face 66. The detent projections 72 are

arranged so as to be aligned along a radial straight line through the center M on the housing rear wall 32. In the exemplary embodiment, the illuminant 23 can thus be rotated by 180 degrees and be connected to the socket 20 in both rotational positions.

Referring to a modified embodiment, a keying arrangement may be provided. The illuminant connection device 70 comprises a keying element 80 that interacts with a keying element of the socket 20 and allows the connection between the illuminant 23 and the socket only in the permissible relative positions. In this manner, electrically wrong connections between the socket 20 and the illuminant 23 can be prevented. It is also possible to provide several keying elements 80. Each keying element 80 is allocated a keying element of the socket 20. The keying element 80 and the associate complementary keying element can have any desired form. For example, the keying element 80 may also be a detent projection 72 or be arranged on the detent projection 72. In the exemplary embodiment, the detent projections 72 act as keying elements 80 that, based on their position, allow only the two above-described orientations of the illuminant 23 when the connection with the socket 20 is being established. Alternatively, the keying arrangements may also allow only one, or more than two, possible relative positions between the illuminant 23 and the socket 20 when the connection is being established.

In this case, the recess 75 has a rectangular and, in particular, a square contour. The recess 75 is centered in the housing rear wall 32. On all four sides, the recess 75 extends in respectively one supply channel 76. The channels 76 and the recess 75 have a common, preferably planar, bottom 77 that forms the rear face 66 of the housing rear wall 32 within the recess 75 and the supply channels. With the connection between the socket 20 and the illuminant 23 established, the supply channels 76 are disposed for accommodating the cable 78 of the supply line 16 connected with the socket 20 (FIG. 4). In the region of the supply channels 76 and the recess 75, the inside of the housing rear wall 32 is essentially planar. Next to this essentially planar region, the housing rear wall 32 has, in its respective corner region, an arrangement of stiffening ribs 79. A receiving region 63 for a respective illuminant contact part 39 is provided in a respective corner region with stiffening ribs 79. The stiffening ribs 79 have recesses for the accommodation of the illuminant contact part 39 in the receiving region 63.

In the exemplary embodiment, the illuminant 23 comprises only a few individual parts: the illuminant housing 30, the carrier element 25 with one or more semiconductor lighting elements, and two illuminant contact parts 39 for each existing semiconductor lighting element. The illuminant contact parts 39 are identical. Consequently, the illuminant 23 can be manufactured in a cost-effective manner. Several illuminants 23 can be grouped in a simple manner, wherein the illumination surfaces 24 can be easily oriented on one plane. Lamps 15 having a large total illumination surface can be composed. Because of the encapsulation of the electrical connections in the illuminant housing 30 the illuminant 23 is also suitable for higher DC voltages in the range of 200 V.

FIG. 6 is an exploded representation of a socket 20 in accordance with the invention. The socket 20 comprises a socket housing 90 that, in the exemplary embodiment, consists of two connectable housing shells 91. The socket housing 90 has four rectangular corners 92 where two adjacent socket housing sides 93 adjoin one another. On at least one, preferably several and, in the exemplary embodiment,

11

all socket housing sides **93** there is a connection region **94** with at least one electrical supply connection **95**.

The supply connection region **94** is represented by a connection recess **96** in the socket housing **90**. In plan view of the socket housing **90**, the connection recess has the shape of a trapeze and represents a notch in the respective socket housing side **93**. Beginning at the side sections adjoining the corners **92**, the connection recess **96** tapers inward through two opposing clamping sides **97** in downward direction. The clamping sides are connected with each other via a center side section **98**. In this center side section **98**, a connection opening **99** is provided for each supply connection **95**. Referring to the exemplary embodiment, respectively one half of the connection opening **99** is provided on one of the two housing shells **91**. In the exemplary embodiment, one or more projecting clamping strips **100** are provided on the clamping sides **97**.

The socket **20** comprises several supply connections **95** displaying different polarities. One part of the supply connections **95** is allocated to the negative pole, and another part is allocated to the positive pole of the supply DC voltage. On each socket housing side **93** there is at least one supply connection **95** associated with the positive pole, as well as a supply connection **95** associated with the negative pole. Referring to the exemplary embodiment of the socket **20** described here, a supply connection **95** associated with the positive pole and a supply connection **95** associated with the negative pole is arranged in the supply connection region **94**. With the connection with the illuminant **23** established, the supply connection region **94** is located at the point within the recess **75** where the supply channels **76** terminate in the recess **75**. In doing so, the maximum width of the connection recess **96** corresponds approximately to the width of the supply channel **76**.

Each supply connection region **94** is associated with a strain relief means **103** that can be detachably fastened to the socket housing **20**, for example with the aid of a center screw **104**. An internal thread **105** is provided on the socket housing **90** and is open toward the center side section **98**. The strain relief means **103** is a clamping member **106** that has a contour adapted to the connection recess **96**. In plan view, it also has a trapezoidal contour. On its inside associated with the center side section **98**, said clamping member also has two flat insertion tabs **107** that can be inserted in associate insertion slits **108** on the socket housing **90**. The insertion slits **108** are respectively located between the internal thread **105** and a connection opening **99**.

On the sides associated with the clamping sides **97**, the clamping member **106** has a clamping edge **109** that—with the clamping member **106** fastened to the socket housing **90**—is located at a distance opposite the two clamping strips **100** of the associate clamping side **97**. A cable **78** provided between the clamping edge **109** and the clamping strips **100** is clamped in place in a non-positive manner and is thus strain-relieved. As a result of the screwed connection **104**, **105** the strain relief is able to absorb sufficient pulling forces on the cable **78**. The number of clamping edges **109** and the clamping strips **100** for cable clamping may vary.

The mechanical connection between the two housing shells **91** can be established by a detent connection, in which case several detent hooks **110** are provided on one housing shell **91**, said detent hooks being brought into detent connection with not specifically illustrated detent counter means on the other housing shell **91** when the two housing shells **91** are being snapped together.

The supply connections **95** are configured as electrical clamping connections. Each supply connection **95** com-

12

prises an electrically conductive connection surface **114**. Each connection surface **114** is associated with a resilient connection clamp **115** the free end of which—in rest position—abuts against the connection surface **114** or is at least located at a minimal distance opposite said connection surface. The connection surface **114** is arranged parallel to an insertion direction **E** next to the insertion opening **99**. On the opposite side of the insertion opening **99**, the connection clamp **115** is connected in a resiliently pivotable manner. In its home position, the connection clamp **115** thus extends behind the associate connection opening **99** in a manner so as to be inclined relative to the connection surface **114**. When a wire end of a cable **78** is inserted, the connection clamp **115** is pivoted away from the associate connection surface **114** by the wire end inserted in insertion direction **E** and pushes the not insulated wire end resiliently against the connection surface **114**, so that a safe electrical contact is established between the wire of the cable **78** and the connection surface **114**. In this manner, when a lamp **15** is mounted, a very simple cabling of the sockets **20** can be accomplished. Inasmuch as the socket **20** comprises supply connections **95** on several and, for example, on all socket housing sides **93**, the supply line **16** can be connected from all sides to the socket **20**.

In the socket housing **90**, all supply connections **95** displaying the same polarity are short-circuited with each other and are thus on the same potential. As a result of this, a very simple series or parallel connection of several sockets **20** or associate illuminants **23** is made possible, because the socket housing **90** on one of the supply connections **95** can be selectively electrically connected to a supply connection **95** of another socket housing **90**. Referring to the exemplary embodiment of the lamp **15** shown by FIG. 1, the sockets **20** are connected in series with each other (supply line **16** in solid and dashed lines). The supply line **16** is routed from the positive pole of the voltage source **17** in series through all the sockets **20** and, beginning with the last socket **20**, is preferably routed directly back to the negative pole of the voltage source **17**. This could be accomplished in an equally simple manner with a parallel connection of the sockets **20**, as has been indicated as an alternative in dotted supply lines **16** in FIG. 1. Due to the fact that the sockets **20** have supply connections **95** from all sides, the effort required for wiring a lamp **15** with several sockets **20** is extremely minimal.

The sockets **20** can also be connected in groups to a respectively allocated voltage source **17** or power source **17** and can preferably be connected in series or also in parallel.

The short circuit of the supply connection **95** displaying the same polarity is achieved in that the connection surfaces **114** of the supply connections **95** displaying the same polarity are provided on a common short-circuit connector **116**. The short-circuit connector **116** is configured as an electrically conductive component. In the exemplary embodiment, it is made of a uniform material in one piece without connecting and joining points and is configured, in particular, as a punched bent part. For example, the short-circuit connector **116** can be punched out of an electrically conductive sheet metal and be bent into the desired form, and can thus be manufactured in a cost-effective and simple manner. All the short-circuit connectors **116** are identical. Therefore, only one type and one single form of the short-circuit connector **116** needs to be manufactured for the socket **20**.

In addition, the short-circuit connector **116** comprises one or more socket connections **117** that are disposed for the electrical connection with an associate illuminant **23**. In the exemplary embodiment, two socket connections **117** are

13

provided on each short-circuit connector **116**, said socket connections thus being electrically short-circuited via the short-circuit connector **116**. As a result of this, not only the supply connections **95** displaying the same polarity but also the socket connections **118** displaying the same polarity are electrically short-circuited—in accordance with the example—via a common short-circuit connector **116**. In the exemplary embodiment, the socket **20** is disposed for connecting one illuminant with two semi-conductor lighting elements, each having one anode and one cathode connection. Consequently, two socket connections **117** displaying positive polarity and two socket connections **117** displaying negative polarity are provided. The number of pairs of socket connections **117** having different polarities can thus depend on the number of semiconductor lighting elements present in the illuminant **23**.

Each short-circuit connector **116** comprises a base section **118** extending essentially on one plane. This base section **118** may have several openings **119**. Different positioning and connecting means provided in the socket housing **90** may extend through the openings **19**, as is illustrated, for example, by FIG. 7.

A socket connection **117** is provided on each of the two opposite ends of the base section **118**. The socket connection **117** comprises two oppositely arranged connection tabs **120** extending in transverse direction away from the base section **118**. Beginning with the base section **118**, the two connection tabs **120** initially extend away from each other up to a kink point **121** and, beginning at the kink point, again toward each other up to their respective free ends, wherein the free ends are a distance from each other. The two connection tabs **121** are identically configured. The socket connection is symmetrical with respect to a center plane. The respective center planes through the socket connections **117** of a short-circuit connector **116** extend at a distance in parallel direction. The center planes of the socket connections **117** are angled at approximately 45 degrees relative to a longitudinal center axis through the base section **118**.

The connection surfaces **114** provided on the short-circuit connector **116** are provided on essentially planar connection parts **122**. The connection surfaces **114** are inclined at an angle of approximately 45 degrees relative to the longitudinal center axis through the base section **118**. Said connection surfaces extend either parallel to the center planes of the socket connections **117** or at a right angle thereto. The connection parts **122** having the connection surfaces **114** extend essentially at a right angle from the base section **118**. The free ends of the connection tabs **120** and the free end edges of the connection parts **122** are arranged on the same side at a distance from the base section **118** and can preferably be located on about one plane. Apart from the socket connections **117**, the short-circuit connector **116** is designed so as to be symmetrical to its longitudinal center plane.

Each connection surface **114** of a short-circuit connector **116** is assigned to another supply connection region **94**. One of the short-circuit connectors **114** has the connection surfaces **114** of the supply connections **95** displaying positive polarity, whereas the other short-circuit connector **116** has the connection surfaces **114** of the supply connections **95** displaying negative polarity.

The supply connections **95** of directly adjacent supply connection regions **94**, said supply connections displaying the same polarity, are arranged—viewed in circumferential direction—next to each other around the socket housing **90**, i.e., beginning from a corner **92**, a supply connection **95** displaying the same polarity follows on both socket housing

14

sides **93**. These two supply connections **95** are allocated a common clamping member **125** having end sections forming a connection clamp **115** for different supply connections **95**. The two connection clamps **115** are connected to each other via a center piece **126**. The connection clamps **115** extend in transverse direction away from the center piece **126**, in which case their distance increases. The center piece **126** and the connection clamp **115** subtend an angle in the range of 100 to 110 degrees. In the exemplary embodiment, the transition between the connection clamp **115** and the center piece **126** is configured so as to be angled twice. An abutment part **127** is bent at a right angle on one longitudinal edge of the center piece **126**, said abutment part being supported by the base surface of one of the two housing halves **91** in the normal position of use. In the transition region between the center piece **126** and the clamping element **115**, the connecting clamp member **125** abuts against respectively one support projection **128** of the socket housing **90**. The support projection **128** is arranged opposite the connection surface **114** next to the connection opening **99** in one of the two housing halves **91**. The abutment part **127** is arranged between the two support projections **128**.

In accordance with the example, two and a total of four connecting clamp members **125** are provided for the four supply connections **95** displaying positive polarity and the four supply connections displaying negative polarity.

In the normal position of use, the two short-circuit connectors **116** cross in the socket housing **90**, wherein they extend relative to each other at an insulation distance **A** at the crossing point. At the crossing point, no insulating materials are provided between the two short-circuit connectors **116**. The region between the two short-circuit connectors **116** at the crossing point is configured as a free space. In order to achieve the insulation distance **A** at the crossing point, one of the two short-circuit members **116** is arranged in back position and, for example, rotated—as in the example—by 90 degrees relative to the respectively other short-circuit member **116** in the socket housing **90**. The free ends of the connection parts **122** and/or the connection tabs **120** of the one short-circuit member **116** are preferably located on a plane where the base section **118** of the respectively other short-circuit member **116** is located. At least the distance of the plane—where the free ends of the connection parts **122** and/or the connection tabs **120** of the one short-circuit member **116** are located—from the base section **118** of the other short-circuit member **116** is smaller than the distance between the two short-circuit members **116**. The base section **118** of the one short-circuit connector abuts against the inside of one housing half **91**, whereas the base section **118** of the respectively other short-circuit connector **116** abuts against the inside of the respectively other housing shell **91**. In other words: the base sections **118** of the two short-circuit connectors **116** are arranged, at an insulation distance **A**, on essentially parallel planes in the socket housing **90**.

The socket **20** comprises a socket connection device **130** disposed for the mechanical and electrical connection of the socket with an associate illuminant **23**. The socket connection device **130** comprises the socket connections **117** that are provided on the short-circuit connectors **116**, in accordance with the example. Furthermore, the socket connection device **130** comprises mechanical connection means that ensure the mechanical connection with the illuminant **23** alone or together with the socket connections **117**. The socket connection device **130** is provided on a connection side **131** of the socket housing **90** and can be accessed from this connection side **131**. The mounting side **132** opposite the connection side **131** is disposed for mounting the socket

15

housing to a mounting surface, for example the wall or ceiling of a room, or to any other surface.

In the exemplary embodiment described here, the mechanical connection means of the socket connection device **130** are formed by the detent edges **133** that are arranged in the socket housing **90** adjoining a socket housing opening **134**. Resiliently supported holding elements **135** are molded to two opposing sides of the socket housing opening **134**, said holding elements being hinged in an elastically pivotable manner adjoining the socket housing opening **134**. On their respective free end, they support the detent edge **133** projecting toward the respectively opposite holding element **135**. Detent projections **72** having detent bulges **73** can extend through the socket housing opening **134** into the socket housing **90** and extend around the detent edges **133** in order to establish the mechanical connection between the socket **20** and the illuminant **23**.

Furthermore, socket connection openings **135** via which the socket connections **117** can be accessed are provided on the connection side **131** of the socket housing **90**. In the exemplary embodiment, each socket connection **117** is allocated two socket connection openings **135** so that both connection tabs **120** of a socket connection **117** can be accessed via respectively one socket connection opening **135**. The socket connection openings **135** have the form of slits for reasons of protection against accidental contact, so that touching the socket connection **117** with a finger becomes impossible.

Preferably, the electrical contact between the illuminant **23** and the socket **20** is ensured in that the illuminant connections **46** come into abutment with the socket connections **117**. In the embodiments described here, the illuminant connections **46** extend around the socket connections **117**. In doing so, the two connection tabs **120** of a socket connection **117** are located between the two contact wings **48** of the associate illuminant connection **46**. In doing so, respectively one contact wing **48** is in abutment with one connection tab **120**. Due to the spring-elastic support of the contact wings **48**, as well as the contact tabs **120**, a mechanical clamping force is also generated when the electrical contact between the illuminant **23** and the socket **20** is being established. Should this mechanical clamping force be sufficient, additional mechanical connection means between the illuminant **23** and the socket **20** can be omitted.

The socket connection device **130** is provided so as to be point-symmetrical with respect to a center P on the connection side **131**. Both the socket housing openings **134** are provided on a radial straight line through the center P at equal distances from the center P in the connection side **131** of the socket housing **20**. In doing so, the socket housing **20** can be rotated by 180 degrees about a rotational axis through the center P and be connected with the illuminant **23** in these two rotational positions.

The present invention relates to an illuminant **23** and a socket **20** for a lamp **15**. The features of the socket **20** can also be implemented independently of the features of the illuminant **23**. The illuminant **23** preferably has a planar illumination surface **24**. One or more semiconductor lighting elements are arranged in an illuminant housing **30**. The illuminant connection device **70** necessary for the mechanical and electrical connection with the socket **20** is provided on the rear face **66** of the illuminant **23** opposite the illumination surface **24**. The dimensions of the illuminant **23** are preferably greater than those of the socket **20**, so that the illuminant **23**—viewed in the direction of the illumination surface **24**—completely covers the socket **20**. As a result of this, it is possible to achieve a particularly visually pleasing

16

appearance. On several socket housing sides **93**, the socket comprises a supply connection region, so that the electrical supply and wiring of the socket **20** can be accomplished selectively from different sides or also, at the same time, from several sides. Irrespective of the number and arrangement of the supply connection regions **94**, several electrical supply connections **95** displaying the same polarity are provided on the socket **20**. These supply connections **95** displaying the same polarity are electrically short-circuited. Respectively one short-circuit connector **116** is disposed for short-circuiting the supply connections displaying the same polarity, in which case in particular two identical short-circuit connectors **116** are arranged in the socket housing **90**. A DC voltage is applied to the socket **20**, which voltage can amount to approximately 200 V. With this socket **20** and the illuminant **23**, it is possible to achieve, in a very simple modular manner, large total illumination surfaces of a lamp **15** featuring a visually pleasing overall appearance.

LIST OF REFERENCE SIGNS

- 15** Lamp
- 16** Supply line
- 17** Voltage source
- 18** Switch
- 20** Socket
- 21** Row
- 22** Column
- 23** Illuminant
- 24** Illumination surface of **23**
- 25** Carrier element
- 26** Front plate or foil
- 27** Rear plate or foil
- 30** Illuminant housing
- 31** Frame
- 32** Housing rear wall
- 33** Light exit opening
- 24** Strip
- 35** Abutment surface
- 36** Strip section
- 39** Illuminant contact part
- 40** Illuminant contact
- 41** Contact point
- 42** Contact tab
- 42a** Planar section of **42**
- 42b** Free end of **42**
- 43** Slit
- 44** First end of **39**
- 45** Second end of **39**
- 46** Illuminant connection
- 47** Crosspiece
- 48** Contact wing
- 49** Bending point
- 51** Holding section of **39**
- 52** Holding clamp
- 53** Offset
- 54** Clamping tab
- 55** Retention opening
- 56** Retention projection
- 57** Spring-elastic zone
- 58** Tab holding part
- 59** Spring tab
- 60** Bearing element
- 63** Receiving region
- 64** Inside of **32**
- 65** Illuminant connection opening
- 66** Rear face

17

67 Locking catch
 68 Frame side
 70 Illuminant connection device
 71 Detent means
 72 Detent projection
 73 Detent bulge
 74a Oblique surface of 73
 74b Detent abutment surface of 73
 75 Recess
 76 Supply channel
 77 Floor
 78 Cable of 16
 79 Stiffening rib
 80 Keying element
 90 Socket housing
 91 Housing shells
 92 Corner of 90
 93 Socket housing side
 94 Supply connection region
 95 Supply connection
 96 Connection recess
 97 Clamping sides
 98 Center side section
 99 Connection opening
 100 Clamping strip
 103 Strain relief means
 104 Screw
 105 Internal thread
 106 Clamping member
 107 Insertion tab
 108 Insertion slit
 109 Clamping edge
 110 Detent hook
 114 Connection surface
 115 Connection clamp
 116 Short-circuit connector
 117 Socket connection
 118 Base section
 119 Opening
 120 Connection tab
 121 Kink point
 122 Connection part
 125 Connecting clamp member
 126 Center piece
 127 Abutment part
 128 Support projection
 130 Socket connection device
 131 Connection side
 132 Mounting side
 133 Detent edge
 134 Socket housing opening
 135 Socket connection opening
 E Insertion direction
 M Center of 23
 P Center of 20

The invention claimed is:

1. Socket for an illuminant (23), the socket (23) comprising:

- a socket housing (90) comprising, on its connection side (131) associated with the illuminant (23), a socket connection device (130) that is disposed for establishing a mechanical and electrical connection with the illuminant (23);
 a mounting side (132) of the socket housing (90) opposite the connection side (131) for mounting the socket (20) to a mounting surface;

18

socket housing sides (93) disposed between the connection side (131) and the mounting side (132) of the socket housing (90), wherein supply connections (95) for the electrical connection of the socket (20) with a supply line (16) are provided on at least one of the socket housing sides (93);

short-circuit connectors (116) arranged in the socket housing (90), the short-circuit connectors having several connection surfaces (114), wherein each supply connection (95) that is to be short-circuited is allocated one of the connection surfaces (114) of the same short-circuit connector (116);

wherein the supply connections (95) display either a positive polarity (+) or a negative polarity (−), and that all supply connections (95) displaying the same polarity (+ or −) are electrically short-circuited with one another.

2. Socket as in claim 1,

wherein individual ones of the supply connections (95) are provided on individual ones of the socket housing sides (93).

3. Socket as in claim 2,

wherein one strain relief means (103) is provided for each supply connection (95).

4. Socket as in claim 3,

wherein the strain relief means (103) is detachably fastened to the socket housing (20).

5. Socket as in claim 2,

wherein on one socket housing side (93) comprising the supply connections (95), the at least one supply connection (95) is assigned to the positive pole and the at least one supply connection (95) is assigned to the negative pole, respectively.

6. Socket as in claim 1,

wherein the socket connection device (130) comprises electrical socket connections (117) that are disposed for the electrical connection of the illuminant (23).

7. Socket as in claim 6,

wherein several socket connections (117) displaying the same polarity (+ or −) are provided and that the socket connections (117) displaying the same polarity (+ or −) are electrically short-circuited with one another.

8. Socket as in claim 7,

wherein the electrical short circuit between the socket connections (117) displaying the same polarity (+ or −) is accomplished by a single short-circuit connector (116), respectively.

9. Socket as in claim 8,

further comprising a short-circuit connector (116) assigned to the negative pole (−) and a short-circuit connector (116) assigned to the positive pole (+), the short-circuit connectors having an identical form.

10. Socket as in claim 8,

wherein each short-circuit connector (116) has a base section (118) and connection parts (122) angled away from the base section (118), each of the connection parts having a connection surface (114).

11. Socket as in claim 8,

wherein the short-circuit connectors (116) assigned to the two different poles (+ or −) are arranged at an insulation distance (A) in the socket housing (90).

12. Socket as in claim 10,

wherein the base sections (118) of the two short-circuit connectors (116) cross at a crossing point while maintaining the insulation distance (A).

19

13. Lamp comprising:
 an illuminant (23) that comprises a plate-like or foil-like
 carrier element (25), the carrier element being a com-
 ponent of a semiconductor lighting element or com-
 prising a semiconductor lighting element;
 an illuminant housing (30) of the illuminant (23), the
 illuminant housing bearing the carrier element (25)
 and, having on its front side, a light exit opening (33)
 and having, on its rear face (66) opposite the front side,
 an illuminant connection device (70);
 a socket (20) having, on its connection side (131) asso-
 ciated with the illuminant housing (30), a socket con-
 nection device (130), wherein the illuminant connec-
 tion device (70), together with the socket connection
 device (130), is disposed to establish a mechanical and
 electrical connection between the illuminant (23) and
 the socket (20);
 wherein the socket (20) further comprises a socket hous-
 ing (90) and short-circuit connectors (116) arranged in
 the socket housing (90), the short-circuit connectors
 having several connection surfaces (114), wherein each
 supply connection (95) that is to be short-circuited is
 allocated one of the connection surfaces (114) of the
 same short-circuit connector (116);

20

wherein the supply connections (95) display either a
 positive polarity (+) or a negative polarity (−), and that
 all supply connections (95) displaying the same polar-
 ity (+ or −) are electrically short-circuited with one
 another.

14. Lamp as in claim 13,
 wherein the light exit opening (33) delimits a planar
 illumination surface (24) of the illuminant (23).

15. Lamp as in claim 14,
 wherein the illuminant (23), when viewed at a right angle
 in the direction of the illumination surface (24), com-
 pletely covers the associate socket (20).

16. Lamp as in claim 13,
 further comprising a plurality of sockets (20).

17. Lamp as in claim 16,
 wherein the illumination surfaces (24) of the illuminants
 (23) arranged on the sockets (20) are located on a
 common plane.

18. Socket as in claim 1,
 wherein on one socket housing side (93) comprising the
 supply connections (95), the at least one supply con-
 nection (95) is assigned to the positive pole and the at
 least one supply connection (95) is assigned to the
 negative pole, respectively.

* * * * *